

Supplementary Table 1. Primers List of BCR RT-PCR

Primer Name	V/D/J gene segments	Primer Sequence(5'>3')	Usage description
GV 01	IGHV1-18*01	CGGTACCGCGGGCCCGGGAatggactggacctggagcat	AP_G_Leader_Mix
GV 02	IGHV1-2*01	CGGTACCGCGGGCCCGGGAatggactggacctggagcat	As forward primer of heavy chain 1st PCR
GV 03	IGHV1-24*01	CGGTACCGCGGGCCCGGGAatggactggacctggagcat	
GV 04	IGHV1-38-4*01	CGGTACCGCGGGCCCGGGAatggactggacctggagcat	
GV 05	IGHV1-45*01	CGGTACCGCGGGCCCGGGAatggactggacctggagcat	
GV 06	IGHV1-46*01	CGGTACCGCGGGCCCGGGAatggactggacctggagcat	
GV 07	IGHV1-58*01	CGGTACCGCGGGCCCGGGAatggactggacctggagcat	
GV 08	IGHV1-69*01	CGGTACCGCGGGCCCGGGAatggactggacctggagcat	
GV 09	IGHV2-26*01	CGGTACCGCGGGCCCGGGAatggacacactttgtctcac	
GV 10	IGHV2-5*01	CGGTACCGCGGGCCCGGGAatggacacactttgtctcac	
GV 11	IGHV2-70*01	CGGTACCGCGGGCCCGGGAatggacacactttgtctcac	
GV 12	IGHV2/OR16-5*01	CGGTACCGCGGGCCCGGGAatggacacactttgtctcac	
GV 13	IGHV3-11*01	CGGTACCGCGGGCCCGGGAatggagtgtgggctgagctg	
GV 14	IGHV3-13*01	CGGTACCGCGGGCCCGGGAatggagtgtgggctgagctg	
GV 15	IGHV3-16*01	CGGTACCGCGGGCCCGGGAatggagtgtgggctgagctg	
GV 16	IGHV3-21*01	CGGTACCGCGGGCCCGGGAatggagtgtgggctgagctg	
GV 17	IGHV3-43*01	CGGTACCGCGGGCCCGGGAatggagtgtgggctgagctg	
GV 18	IGHV3-48*01	CGGTACCGCGGGCCCGGGAatggagtgtgggctgagctg	
GV 19	IGHV3-49*01	CGGTACCGCGGGCCCGGGAatggagtgtgggctgagctg	
GV 20	IGHV3-53*01	CGGTACCGCGGGCCCGGGAatggagtgtgggctgagctg	
GV 21	IGHV3-64*01	CGGTACCGCGGGCCCGGGAatggagtgtgggctgagctg	
GV 22	IGHV3-64D*06	CGGTACCGCGGGCCCGGGAatggagtgtgggctgagctg	
GV 23	IGHV3-7*01	CGGTACCGCGGGCCCGGGAatggagtgtgggctgagctg	
GV 24	IGHV3-9*01	CGGTACCGCGGGCCCGGGAatggagtgtgggctgagctg	
GV 25	IGHV4-28*01	CGGTACCGCGGGCCCGGGAatgaaacacctgtggttctt	
GV 26	IGHV4-38-2*02	CGGTACCGCGGGCCCGGGAatgaaacacctgtggttctt	
GV 27	IGHV4-39*01	CGGTACCGCGGGCCCGGGAatgaaacacctgtggttctt	
GV 28	IGHV4-59*01	CGGTACCGCGGGCCCGGGAatgaaacacctgtggttctt	
GV 29	IGHV5-10-1*02	CGGTACCGCGGGCCCGGGAatgaaacacctgtggttctt	
GV 30	IGHV5-51*01	CGGTACCGCGGGCCCGGGAatgaaacacctgtggttctt	
GV 31	IGHV6-1*01	CGGTACCGCGGGCCCGGGAatgaaacacctgtggttctt	
KV 01	IGKV1/OR2-4*01	CGGTACCGCGGGCCCGGGAatgagggtccccactcaagct	AP_K_Leader_Mix
KV 02	IGKV1/OR2-108*01	CGGTACCGCGGGCCCGGGAatgagggtccccactcaagct	As forward primer of kappa light chain 1st PCR
KV 03	IGKV1-16*01	CGGTACCGCGGGCCCGGGAatgagggtccccactcaagct	
KV 04	IGKV1-27*01	CGGTACCGCGGGCCCGGGAatgagggtccccactcaagct	
KV 05	IGKV1-5*01	CGGTACCGCGGGCCCGGGAatgagggtccccactcaagct	
KV 06	IGKV1-8*01	CGGTACCGCGGGCCCGGGAatgagggtccccactcaagct	
KV 07	IGKV1D-16*01	CGGTACCGCGGGCCCGGGAatgagggtccccactcaagct	
KV 08	IGKV1D-43*01	CGGTACCGCGGGCCCGGGAatgagggtccccactcaagct	
KV 09	IGKV2-24*01	CGGTACCGCGGGCCCGGGAatgagggtccccactcaagct	
KV 10	IGKV2-28*01	CGGTACCGCGGGCCCGGGAatgagggtccccactcaagct	
KV 11	IGKV3/OR2-268*01	CGGTACCGCGGGCCCGGGAatgagggtccccactcaagct	
KV 12	IGKV3-15*01	CGGTACCGCGGGCCCGGGAatgagggtccccactcaagct	
KV 13	IGKV3-20*01	CGGTACCGCGGGCCCGGGAatgagggtccccactcaagct	
KV 14	IGKV3-7*01	CGGTACCGCGGGCCCGGGAatgagggtccccactcaagct	
KV 15	IGKV3D-7*01	CGGTACCGCGGGCCCGGGAatgagggtccccactcaagct	
KV 16	IGKV4-1*01	CGGTACCGCGGGCCCGGGAatgagggtccccactcaagct	
KV 17	IGKV5-2*01	CGGTACCGCGGGCCCGGGAatgagggtccccactcaagct	
KV 18	IGKV6-21*01	CGGTACCGCGGGCCCGGGAatgagggtccccactcaagct	
KV 19	IGKV6D-41*01	CGGTACCGCGGGCCCGGGAatgagggtccccactcaagct	
LV 01	IGLV1-40*01	CGGTACCGCGGGCCCGGGAatggcctggctctctctctct	AP_L_Leader_Mix
LV 02	IGLV1-41*01	CGGTACCGCGGGCCCGGGAatggcctggctctctctctct	As forward primer of lambda light chain 1st PCR
LV 03	IGLV1-47*02	CGGTACCGCGGGCCCGGGAatggcctggctctctctctct	
LV 04	IGLV10-54*02	CGGTACCGCGGGCCCGGGAatggcctggctctctctctct	
LV 05	IGLV11-55*01	CGGTACCGCGGGCCCGGGAatggcctggctctctctctct	
LV 06	IGLV2-8*02	CGGTACCGCGGGCCCGGGAatggcctggctctctctctct	
LV 07	IGLV3-1*01	CGGTACCGCGGGCCCGGGAatggcctggctctctctctct	
LV 08	IGLV3-10*02	CGGTACCGCGGGCCCGGGAatggcctggctctctctctct	
LV 09	IGLV3-19*01	CGGTACCGCGGGCCCGGGAatggcctggctctctctctct	
LV 10	IGLV3-21*01	CGGTACCGCGGGCCCGGGAatggcctggctctctctctct	
LV 11	IGLV3-25*02	CGGTACCGCGGGCCCGGGAatggcctggctctctctctct	
LV 12	IGLV3-27*01	CGGTACCGCGGGCCCGGGAatggcctggctctctctctct	
LV 13	IGLV3-9*02	CGGTACCGCGGGCCCGGGAatggcctggctctctctctct	
LV 14	IGLV4-3*01	CGGTACCGCGGGCCCGGGAatggcctggctctctctctct	
LV 15	IGLV4-60*02	CGGTACCGCGGGCCCGGGAatggcctggctctctctctct	
LV 16	IGLV5-39*02	CGGTACCGCGGGCCCGGGAatggcctggctctctctctct	
LV 17	IGLV6-57*02	CGGTACCGCGGGCCCGGGAatggcctggctctctctctct	
LV 18	IGLV7-43*01	CGGTACCGCGGGCCCGGGAatggcctggctctctctctct	
LV 19	IGLV8-61*02	CGGTACCGCGGGCCCGGGAatggcctggctctctctctct	
LV 20	IGLV8/OR8-1*02	CGGTACCGCGGGCCCGGGAatggcctggctctctctctct	
LV 21	IGLV9-49*02	CGGTACCGCGGGCCCGGGAatggcctggctctctctctct	
IGHJ 01	IGHJ1*01	GATGGGCCCTTGGTGGAGGGTGAGGACAGGTGACACAGG	IGHJ_region_Primer_Mix
IGHJ 02	IGHJ2*01	GATGGGCCCTTGGTGGAGGGTGAGGACAGGTGACACAGG	
IGHJ 03	IGHJ3*01	GATGGGCCCTTGGTGGAGGGTGAGGACAGGTGACACAGG	
IGHJ 04	IGHJ6*01	GATGGGCCCTTGGTGGAGGGTGAGGACAGGTGACACAGG	
IGKJ 01	IGKJ1*01	GATGGTGCAGCCACAGTTCGTTTATCCACCTTGCTGCC	IGKJ_region_Primer_Mix
IGKJ 02	IGKJ2*01	GATGGTGCAGCCACAGTTCGTTTATCCACCTTGCTGCC	
IGKJ 03	IGKJ3*01	GATGGTGCAGCCACAGTTCGTTTATCCACCTTGCTGCC	
IGKJ 04	IGKJ4*01	GATGGTGCAGCCACAGTTCGTTTATCCACCTTGCTGCC	
IGKJ 05	IGKJ5*01	GATGGTGCAGCCACAGTTCGTTTATCCACCTTGCTGCC	
IGLJ 01	IGLJ1*01	GGGGCAGCCTTGGGCTGACCTAGGACGGTGACCTTGCTCC	IGLJ_region_Primer_Mix
IGLJ 02	IGLJ2*01	GGGGCAGCCTTGGGCTGACCTAGGACGGTGACCTTGCTCC	
IGLJ 03	IGLJ4*01	GGGGCAGCCTTGGGCTGACCTAATAATGATCAGCTGGGTTCC	
IGLJ 04	IGLJ5*01	GGGGCAGCCTTGGGCTGACCTAGGACGGTGACCTTGCTCC	
IGLJ 05	IGLJ5*02	GGGGCAGCCTTGGGCTGACCTAGGACGGTGACCTTGCTCC	
IGLJ 06	IGLJ6*01	GGGGCAGCCTTGGGCTGACCGAGGACGGTGACCTTGCTCC	
IGLJ 07	IGLJ7*01	GGGGCAGCCTTGGGCTGACCGAGGACGGTGACCTTGCTCC	
IGLJ 08	IGLJ7*02	GGGGCAGCCTTGGGCTGACCGAGGACGGTGACCTTGCTCC	
G289-primer	N.D.	TCTTGTCCACCTTGGTGTGCT	As reverse primer of heavy chain RT & 1st PCR
G97-primer	N.D.	AGTAGTCTTACCAGGACGCCAG	As reverse primer of heavy chain 2nd PCR
K244-primer	N.D.	GTTCCTCGTAGTCTGCTTCTCTCA	As reverse primer of kappa light chain RT & 1st PCR
K194-primer-01	N.D.	GTGCTGTCTTGTCTCTCTCTCT	As reverse primer of kappa light chain 2nd PCR
K194-primer-02	N.D.	GTGCTGTCTTGTCTCTCTCTCT	
L81-primer	N.D.	CACAGTGTGGCCTTGTGGCTTG	As reverse primer of lambda light chain RT & 1st PCR
L19-primer-01	N.D.	GGGCGGGAACAGAGTGACC	As reverse primer of lambda light chain 2nd PCR
L19-primer-02	N.D.	GGGCGGGAACAGAGTGACC	
L19-primer-03	N.D.	GGGCGGGAACAGAGTGACC	
AP3	N.D.	CGGTACCGCGGGCCCGGGA	As forward primer of 2nd PCR
G20FP	N.D.	CCCTCCACCAAGGGCCCATC	Construction of the linear antibody expression cassettes
K20FP	N.D.	CGAAGTGTGGCTGCACCATC	
L20FP	N.D.	GGTACGCCAAGGCTGCCCC	
CMV-FP-01	N.D.	AGATATACGGTGTGACATTG	
CMV-RP	N.D.	TCCCGGGCCCGCGGTACCG	
WPRE-RP	N.D.	AGCCCCAGCTGCACGATCT	

Supplementary Table 2. The annotation of linear antibody expression cassettes

Linear expression cassettes For IGHC

CMV-PP_Primer	[AGATATACGCGTTGACATTG] [ATTATTGACTAGTATTAAATAGTAATCAATTACGGGGTCATTAGTTTCATAGCCCATATATGGAGTTCGCGGTTACATAAATACGGTAAATGGCCCGCCTGGCTGACGCCAACGACCCCGCCCATTTGACGTCAATAAT
CMV promoter	GACGTATGTTCCCATAGTAACGCCAATAGGGACTTTCCATTGACGTCAATGGGTGGAGTATTACGGTAAACTGCCACTTGGCAGTACATCAAGTGTATCATATGCCAAGTACGCCCCCTATTGACGTCAATGACGGTAAATGGCCCGCCTGGCATTATGCC
CMV-RP_Primer	AGTACATGACCTTATGGGACTTTCCCTACTTGGCAGTACATCTACGTATTAGTCTACGCTATTACCATGGTGATCGGGTTTGGCAGTACATCAATGGGCGTGGATAGCGGTTTGACTCACGGGATTTCCAAGTCTCCACCCCATTTGACGTCAATGGGAGTTTG
G20_Primer	TTTTGGCACAAAATCAACGGGACTTTCCAAAATGTCGTAACAACCTCCGCCCATTTGACGCAAAATGGGCGTAGGCGTGTACGTTGGAGGTCATATAAGCAGAGCTCGTTTAGTGAACCGTCAGATCGCTGGAGACGCCATCCACGCTGTTTTGACCTCCA
hman IGHG1 Constant region]TAGAAGACACCGGGACCGATCCAGCCTCCGGACTCTAGACTTCGAATTTCTGCACTCGA [CGGTACCGCGGGCCCGGGA] [2nd-PCR_
WPRES	product.] [CCCTCCACCAAGGCCCATC] [GGTCTCCCCCTGGCACCCCTCCCAAGAGCACCTCTGGGGCACAGCGGCCCTGGGTCGCTTGGTCAAGGACTACTTCCCGAACCGGTGACGGTGTGCTGGAACTCAGCGCCCTGACCAGCGCGTGCAC
poly(A) signal	ACCTTCCCGCTCTCTACAGTCTCTCAGACTCTACTCCCTCAGCAGCGTGTGACCGTGCCTCCAGCAGCTTGGGCACCCAGACTACATCTGCAACCTGAATCACAAGCCAGCAACCAAGTGGACAGAAAGTGTAGGCCAAAATCTTTGTGACAAAAC
WPRES RP_Primer	TCACACATGCCACCGTGCACGACCTGAACCTCTGGGGGACCGTCACTTCTCTCTCCCCCAAAACCAAGGACACCTCATGATCTCCCGGACCCCTGAGGTCAATGCTGGTGGTGGAGCTGAGCCACGAAAGACCTGAGGTCAAGTTCAACTGGT
	ACGTGGACCGCGTGGAGGTGCATAATGCCAAGACAAAACCGCGGGAGGAGCAGTACAACAGCACGTACCCTGTGGTCAAGCTCCACCGCTCCAGCAGGACTGGCTGAATGGCAAGGAGTACAAGTGAAGGTCTCCAACAAGCCCTCCAGCCCATC
	GAGAAAACCATCTCCAAGGCCAAGGGCAGCCCGGAGAACACAGGTGTACACCTGCCCCATCCCGGGATGAGCTGACCAAGAACAGGTGACCTGACCTGCCTGGTCAAAGGCTTCTATCCAGCGACATCCGCTGGAGTGGGAGAGCAATGGCAGCC
	GGAGAACAACACAAAGCACCGCTCCGCTGCTGGACTCCGACGGCTCTTCTCTCTACAGCAAGCTCACCTGGACAAGAGCAGGTGGCAGCAGGGGAACGCTTCTCATGCTCCGTGATGATGAGGCTCTGCACAACCACTACACGCAGAAAGACCTCT
	CCCTGTCTCCGGTAAATGA] GAATTCGCGGCCGAGTTGATATCT [CGACAATCAACCTCTGGATTACAAAATTTGTGAAAGATTGACTGGTATTCTTAACTATGTTGCTCCTTTTACGCTATGTTGGATACGCTGCTTTAATGCCTTTGTATCATGCTATT
	GCTTCCCGTATGGCTTTCATTTTCTCTCTTGTATAAAATCTGGTTGCTGTCTTTATGAGGAGTTGTGGCCCGTTGTCCAGCAACCTGGCGTGTGACTGTTTGTGCTGACGCAACCCCACTGGTGGGGCATTTGCCACCCTGTGACCTCTTTTC
	CGGGACTTTTCGCTTTCCCCCTCCCTATTGCGCAGCGGAACTCATFCGCGCCTGCTTGGCCGCTGCTGGACAGGGGCTCGGCTGTTGGGACTGACAAATTCGTTGGTGTGTTGCGGGAAAGTCAAGTCTTCCATGGCTGCTCGCCTGTGTTGCCACCTGGA
	TTCCTGCGGGGACGCTTCTTGTGCTACGTCCTTCCGCCCTCAATCCAGCGGACCTTCTTCCCGCGGCTGCTGCCGGCTTCCGCGCTTCCGCGCTTCCGCTTCCGCTCAGACGAGTCGGATCTCCCTTTGGCGCCTCCCGCCTGG] [AAACGGGG
	GAGGCTAACTGAAACACGGAAGGAGACAATACCGGAAGGAAACCGCGCTATGACGGCAATAAAAAGACAGAATAAAACGACAGCGGTGTTGGTCTGTTTTCATAAACCGGGGTTCCGTCACAGGGCTGGCACTCTGTCGATACCCACCGAGACCCCATTTGG
	GGCCAAACGCGCCGCTTCTTCTTTTCCCAACCCACCCCAAGTTCCGGGTGAAGGCCAGGGCTCGCAGCAACGTCGGGGCGGACGGCCCTGCCATAGC] [AGATCTGCGCAGCTGGGGCT]

Linear expression cassettes For IGK(kappa)

CMV-PP_Primer	[AGATATACGCGTTGACATTG] [ATTATTGACTAGTATTAAATAGTAATCAATTACGGGGTCATTAGTTTCATAGCCCATATATGGAGTTCGCGGTTACATAAATACGGTAAATGGCCCGCCTGGCTGACGCCAACGACCCCGCCCATTTGACGTCAATAAT
CMV promoter	GACGTATGTTCCCATAGTAACGCCAATAGGGACTTTCCATTGACGTCAATGGGTGGAGTATTACGGTAAACTGCCACTTGGCAGTACATCAAGTGTATCATATGCCAAGTACGCCCCCTATTGACGTCAATGACGGTAAATGGCCCGCCTGGCATTATGCC
CMV-RP_Primer	AGTACATGACCTTATGGGACTTTCCCTACTTGGCAGTACATCTACGTATTAGTCTACGCTATTACCATGGTGATCGGGTTTGGCAGTACATCAATGGGCGTGGATAGCGGTTTGACTCACGGGATTTCCAAGTCTCCACCCCATTTGACGTCAATGGGAGTTTG
K20_Primer	TTTTGGCACAAAATCAACGGGACTTTCCAAAATGTCGTAACAACCTCCGCCCATTTGACGCAAAATGGGCGTAGGCGTGTACGTTGGAGGTCATATAAGCAGAGCTCGTTTAGTGAACCGTCAGATCGCTGGAGACGCCATCCACGCTGTTTTGACCTCCA
hman IGHG1 Constant region]TAGAAGACACCGGGACCGATCCAGCCTCCGGACTCTAGACTTCGAATTTCTGCACTCGA [CGGTACCGCGGGCCCGGGA] [2nd-PCR_
WPRES	product.] [CGAAGTGTGGCTGCACATC] [TGTCTTATCTTCCCGCCCTGATGAGCAGTTGAAATCTGGAACCTGCCCTGTTGTGCTGCTGCTGAATAAATCTTATCCAGAGAGGCCAAAAGTACAGTGAAGGTGGATAACGCCCTCCAATCGGGTAAAC
poly(A) signal	TCCAGGAGAGTGTACAGAGCAGGACAGCAAGGACAGCACTACAGCCTCAGCAGCAGCCCTGACGCTGAGCAAAAGCAGACTACGAGAAAACAAAAGTCTACGCTTCCGAAAGTCAACCAAGAGGTTCAACAGGGGAGA
WPRES RP_Primer	GTGTTAG] GAATTCGCGGCCGCGAGTTGATATCT [CGACAATCAACCTCTGGATTACAAAATTTGTGAAAGATTGACTGGTATTCTTAACTATGTTGCTCCTTTTACGCTATGTTGGATACGCTGCTTTAATGCCTTTGTATCATGCTATTGCTTCCCGTATGG
	CTTTCAATTTCTCTCTTGTATAAAATCTGGTTGCTGTCTTTATGAGGAGTTGTGGCCCGTTGTCCAGCAACCTGGCGTGTGACTGTTTGTGCTGACGCAACCCCACTGGTGGGGCATTTGCCACCCTGTGACCTCTTTCCGGGACTTTTCGCT
	TTCCCCCTCCCTATTGCCACGGCGGAACTCATFCGCGCCTGCTTCCCGCCTGCTGGACAGGGGCTCGGCTGTTGGGACTGACAAATCCGTTGTTGTGCGGGAAAGTCAAGTCTTCCATGGCTGCTCGCCTGTGTTGCCACCTGGAAATCTGCGCGGGAC
	GTCTTCTGCTACGTCCTTCCGCCCTCAATCCAGCGGACCTTCTTCCCGCGGCTGCTGCCGGCTCTGCGGCTCTTCCGCTCTTCCGCTTCCGCTTCCGCTTCCGCTTCCGCTTCCGCTTCCGCTTCCGCTTCCGCTTCCGCTTCCGCTTCCGCTTCCGCTTCCGCTTCCGCT
	ACACGGAAGGAGACAATACCGGAAGGAAACCGCGCTATGACGGCAATAAAAAGACAGAATAAAACGACAGCGGTGTTGGTCTGTTTTCATAAACCGGGGTTCCGTCACAGGGCTGGCACTCTGTCGATACCCACCGAGACCCCATTTGGGGCCAAATAGCCCC
	CGTCTTCTCTTTTCCCAACCCACCCCAAGTTCCGGGTGAAGGCCAGGGCTCGCAGCAACGTCGGGGCGGACGGCCCTGCCATAGC] [AGATCTGCGCAGCTGGGGCT]

Linear expression cassettes For IGL(lambda)

CMV-PP_Primer	[AGATATACGCGTTGACATTG] [ATTATTGACTAGTATTAAATAGTAATCAATTACGGGGTCATTAGTTTCATAGCCCATATATGGAGTTCGCGGTTACATAAATACGGTAAATGGCCCGCCTGGCTGACGCCAACGACCCCGCCCATTTGACGTCAATAAT
CMV promoter	GACGTATGTTCCCATAGTAACGCCAATAGGGACTTTCCATTGACGTCAATGGGTGGAGTATTACGGTAAACTGCCACTTGGCAGTACATCAAGTGTATCATATGCCAAGTACGCCCCCTATTGACGTCAATGACGGTAAATGGCCCGCCTGGCATTATGCC
CMV-RP_Primer	AGTACATGACCTTATGGGACTTTCCCTACTTGGCAGTACATCTACGTATTAGTCTACGCTATTACCATGGTGATCGGGTTTGGCAGTACATCAATGGGCGTGGATAGCGGTTTGACTCACGGGATTTCCAAGTCTCCACCCCATTTGACGTCAATGGGAGTTTG
L20_Primer	TTTTGGCACAAAATCAACGGGACTTTCCAAAATGTCGTAACAACCTCCGCCCATTTGACGCAAAATGGGCGTAGGCGTGTACGTTGGAGGTCATATAAGCAGAGCTCGTTTAGTGAACCGTCAGATCGCTGGAGACGCCATCCACGCTGTTTTGACCTCCA
hman IGHG1 Constant region]TAGAAGACACCGGGACCGATCCAGCCTCCGGACTCTAGACTTCGAATTTCTGCACTCGA [CGGTACCGCGGGCCCGGGA] [2nd-PCR_
WPRES	product.] [GGTACGCCCAAGGCCATC] [CTCGGTCACTCTGTTCCCGCCCTGCTTCCCGCCTGCTGGACAGGGGCTCGGCTGTTGGGACTGACAAATTCGTTGGTGTGTTGCGGGAAAGTCAAGTCTTCCATGGCTGCTCGCCTGTGTTGCCACCTGGAATTC
poly(A) signal	ATAG] GAATTCGCGGCCGCGAGTTGATATCT [CGACAATCAACCTCTGGATTACAAAATTTGTGAAAGATTGACTGGTATTCTTAACTATGTTGCTCCTTTTACGCTATGTTGGATACGCTGCTTTAATGCCTTTGTATCATGCTATTGCTTCCCGTATGGCTT
WPRES RP_Primer	TCATTTTCTCCTCTTGTATAAAATCTGGTTGCTGTCTTTATGAGGAGTTGTGGCCCGTTGTCCAGCAACCTGGCGTGTGACTGTTTGTGCTGACGCAACCCCACTGGTGGGGCATTTGCCACCCTGTGACCTCTTTCCGGGACTTTTCGCTTTC
	CCCTTCCCTATTGCCACGGCGGAACTCATFCGCGCCTGCTTGGCCGCTGCTGGACAGGGGCTCGGCTGTTGGGACTGACAAATTCGTTGGTGTGTTGCGGGAAAGTCAAGTCTTCCATGGCTGCTCGCCTGTGTTGCCACCTGGAAATTCGCGCGGGACGTC
	CTTCTGCTACGTCCTTCCGCCCTCAATCCAGCGGACCTTCTTCCCGCGGCTGCTGCCGGCTTCCGCGCTTCCGCGCTTCCGCTTCCGCTTCCGCTTCCGCTTCCGCTTCCGCTTCCGCTTCCGCTTCCGCTTCCGCTTCCGCTTCCGCTTCCGCTTCCGCTTCCGCTTCCGCT
	CGGAAGGAGACAATACCGGAAGGAAACCGCGCTATGACGGCAATAAAAAGACAGAATAAAACGACAGCGGTGTTGGTCTGTTTTCATAAACCGGGGTTCCGTCACAGGGCTGGCACTCTGTCGATACCCACCGAGACCCCATTTGGGGCCAAATAGCCCCGCG
	TTCCTTCTTTTCCCAACCCACCCCAAGTTCCGGGTGAAGGCCAGGGCTCGCAGCAACGTCGGGGCGGACGGCCCTGCCATAGC] [AGATCTGCGCAGCTGGGGCT]

Supplementary Table 3. Patient information

Subject	Age (years)	Sex	Subject type	Clinical classification (mild:0, severe:1)	City where infected	Date of admission	Date of discharge	Date of blood sample collection	Volume of collected blood sample
P#1	46	F	SARS-CoV-2 convalescence patient	0	Chongqing	2/3/2020	2/28/2020	3/16/2020	30ml
P#2	50	M	SARS-CoV-2 convalescence patient	0	Chongqing	2/2/2020	2/28/2020	3/16/2020	30ml
P#3	54	M	SARS-CoV-2 convalescence patient	1	Chongqing	1/29/2020	2/18/2020	3/16/2020	30ml
P#4	47	M	SARS-CoV-2 convalescence patient	1	Chongqing	1/27/2020	2/23/2020	3/16/2020	30ml
P#5	48	F	SARS-CoV-2 convalescence patient	0	Chongqing	2/16/2020	2/28/2020	3/16/2020	30ml
P#6	31	M	SARS-CoV-2 convalescence patient	0	Chongqing	1/30/2020	2/10/2020	3/16/2020	30ml
P#7	45	F	SARS-CoV-2 convalescence patient	0	Chongqing	2/1/2020	2/15/2020	3/16/2020	30ml
P#8	51	F	SARS-CoV-2 convalescence patient	0	Chongqing	1/31/2020	2/17/2020	3/16/2020	50ml
P#9	48	M	SARS-CoV-2 convalescence patient	1	Chongqing	1/30/2020	2/18/2020	4/1/2020	50ml
P#10	31	M	SARS-CoV-2 convalescence patient	0	Chongqing	1/29/2020	2/18/2020	4/1/2020	50ml
P#11	54	M	SARS-CoV-2 convalescence patient	0	Chongqing	2/2/2020	2/18/2020	4/1/2020	30ml
P#12	47	F	SARS-CoV-2 convalescence patient	0	Chongqing	1/31/2020	2/10/2020	4/1/2020	10ml
P#13	38	M	SARS-CoV-2 convalescence patient	0	Chongqing	2/10/2020	2/19/2020	4/1/2020	10ml
P#14	33	F	SARS-CoV-2 convalescence patient	0	Chongqing	2/10/2020	3/9/2020	4/1/2020	10ml
P#15	44	M	SARS-CoV-2 convalescence patient	0	Chongqing	2/5/2020	2/14/2020	4/1/2020	50ml
P#16	60	F	SARS-CoV-2 convalescence patient	0	Chongqing	2/11/2020	3/5/2020	4/1/2020	30ml
P#17	48	M	SARS-CoV-2 convalescence patient	0	Chongqing	2/12/2020	3/6/2020	4/1/2020	30ml
P#18	53	F	SARS-CoV-2 convalescence patient	0	Chongqing	2/16/2020	2/28/2020	4/1/2020	10ml
P#19	57	M	SARS-CoV-2 convalescence patient	0	Chongqing	1/29/2020	2/14/2020	4/1/2020	10ml
P#20	44	M	SARS-CoV-2 convalescence patient	0	Chongqing	2/6/2020	2/29/2020	4/1/2020	10ml
P#21	44	F	SARS-CoV-2 convalescence patient	0	Chongqing	2/13/2020	3/11/2020	4/1/2020	30ml
P#22	20	F	SARS-CoV-2 convalescence patient	0	Chongqing	2/15/2020	2/25/2020	4/1/2020	30ml
P#23	37	M	SARS-CoV-2 convalescence patient	0	Chongqing	2/2/2020	3/9/2020	4/1/2020	50ml
P#24	44	F	SARS-CoV-2 convalescence patient	0	Chongqing	2/3/2020	2/28/2020	4/1/2020	50ml
P#25	41	M	SARS-CoV-2 convalescence patient	0	Chongqing	1/31/2020	2/16/2020	4/1/2020	14ml
P#26	66	M	SARS-CoV-2 convalescence patient	0	Chongqing	2/3/2020	2/16/2020	4/1/2020	10ml
P#27	67	F	SARS-CoV-2 convalescence patient	0	Chongqing	2/4/2020	2/16/2020	4/1/2020	10ml
P#28	50	M	SARS-CoV-2 convalescence patient	1	Chongqing	2/1/2020	2/29/2020	4/1/2020	30ml
P#29	50	F	SARS-CoV-2 convalescence patient	0	Chongqing	1/28/2020	2/29/2020	4/1/2020	50ml
P#30	49	F	SARS-CoV-2 convalescence patient	0	Chongqing	2/8/2020	3/6/2020	4/1/2020	30ml
P#31	56	M	SARS-CoV-2 convalescence patient	0	Chongqing	2/1/2020	2/9/2020	4/1/2020	30ml
P#32	55	M	SARS-CoV-2 convalescence patient	0	Chongqing	2/14/2020	2/21/2020	4/1/2020	50ml
P#33	45	F	SARS-CoV-2 convalescence patient	0	Chongqing	2/1/2020	2/15/2020	4/1/2020	30ml
P#34	47	F	SARS-CoV-2 convalescence patient	0	Chongqing	2/6/2020	2/17/2020	4/1/2020	10ml
P#35	34	M	SARS-CoV-2 convalescence patient	0	Chongqing	1/28/2020	2/7/2020	4/1/2020	10ml
P#36	47	M	SARS-CoV-2 convalescence patient	1	Chongqing	1/27/2020	2/23/2020	4/1/2020	50ml
P#37	56	M	SARS-CoV-2 convalescence patient	0	Chongqing	1/30/2020	2/7/2020	4/1/2020	40ml
P#38	63	F	SARS-CoV-2 convalescence patient	0	Chongqing	2/1/2020	2/25/2020	4/1/2020	10ml
P#39	37	M	SARS-CoV-2 convalescence patient	0	Chongqing	1/27/2020	2/14/2020	4/1/2020	10ml

Supplementary Table 4. Three batches of S-RBD specific B memory cell sorting and efficiency evaluation

Supplementary Table 4. Three batches of S-RBD specific B memory cell sorting and efficiency evaluation									Efficiency Evaluation		
Batch	Sample count	Subject	Volume of blood used for sorting(ml)	Total volume of blood(ml)	Number of sorted single B cells	Number of Paired mAbs after BCR RT-PCR	Number of Specific mAbs (note-01)	Number of Potential Neutralizing mAbs (note-01)	Percent of paired mAbs gene in sorted&cloned single cells	Percent of specific mAbs in paired mAbs gene	Percent of the potential neutralizing mAbs in the specific mAbs
0428	1	p#10	10	70	192	72	29	12	38%	40%	41%
	2	p#11	10								
	3	p#29	10								
	4	p#30	10								
	5	p#32	10								
	6	p#36	10								
	7	p#37	10								
0505	1	p#8	10	60	1056	324	127	75	31%	39%	59%
	2	p#16	15								
	3	p#17	15								
	4	p#26	10								
	5	p#27	10								
0528	1	p#01	10	75	432	101	42	9	23%	42%	21%
	2	p#03	10								
	3	p#04	10								
	4	p#06	10								
	5	p#09	10								
	6	p#22	10								
	7	p#25	5								
	8	p#28	5								
	9	p#31	5								
				sum=205	sum=1680	sum=497	sum=198	sum=96	mean=31%	mean=40%	mean=41%

Note-01: the linear expression cassettes were transfected into 293T cells for expressing Ab proteins. The supernatants of cell cultures were collected 48hs later. the specific binding ability were assessed by ELISA. the neutralization capability were assessed by pseudovirus assay, and the mAbs, of which neutralizing effect were over 75%, were termed as Neutralizing mAbs.

Supplementary Table 5. Gene family analysis of monoclonal antibodies

Number	Ab_ID	Heavy chain				Light chain			
		V-GENE and allele	D-GENE and allele	J-GENE and allele	CDR3-IMGT(aa)	V-GENE and allele	J-GENE and allele	CDR3-IMGT(aa)	
1	81E8	IGHV2-70*15 F	IGHD6-13*01 F	IGHJ4*02 F	ARVQVAAGSPYDY	IGKV1-39*01 F	IGKJ1*01 F	QQYTSPTPT	
2	81D2	IGHV3-53*01 F	IGHD3-3*01 F	IGHJ4*02 F	ARFRYGDYDPDY	IGKV1-33*01 F	IGKJ3*01 F	QQYDNLPSFT	
3	81A2	IGHV4-34*01 F	IGHD2-2*02 F	IGHJ6*02 F	GVVPCSSSSCYRYGMDV	IGKV1-9*01 F	IGKJ5*01 F	QQLNSYPOAT	
4	81C8	IGHV3-33*01 F	IGHD3-3*01 F	IGHJ4*02 F	ARDGVDFGMVTLFDY	IGKV1-39*01 F	IGKJ1*01 F	QQSYNTPPWT	
5	81A1	IGHV4-59*01 F	IGHD6-19*01 F	IGHJ3*02 F	ARDQGYSSGWNDAFDI	IGLV2-23*01 F	IGLJ3*02 F	CSYAGSRFWV	
6	81A11	IGHV1-69*02 F	IGHD1-7*01 F	IGHJ2*01 F	AREAGATDWWYDFDL	IGLV1-40*01 F	IGLJ2*01 F	QSYDSSLSVVV	
7	81C3	IGHV4-39*01 F	IGHD3-3*01 F	IGHJ4*02 F	ARHPRFWSRGNDSGYFDY	IGLV2-14*01 F	IGLJ1*01 F	SSFTSSSTPYV	
8	81C7	IGHV2-5*02 F	IGHD3-10*01 F	IGHJ4*02 F	AHSMVRGVLFAGDFDY	IGLV1-36*01 F	IGLJ3*02 F	AAWDDSLNPGV	
9	81D5	IGHV5-51*01 F	IGHD1-26*01 F	IGHJ3*02 F	ARRWDGVGFDI	IGLV3-19*01 F	IGLJ1*01 F	NSRSDSSINHYV	
10	81F2	IGHV4-34*01 F	IGHD1-14*01 ORF	IGHJ5*02 F	ARGWTVPLWVWLNWDFP	IGKV2-28*01 F	IGKJ4*01 F	MQALQTPRT	
11	81G8	IGHV3-7*05 F	IGHD4-23*01 ORF	IGHJ4*02 F	ARSPHYVGGFDY	IGLV6-57*02 F	IGLJ3*02 F	QSYHNSVWV	
12	81E1	IGHV1-24*01 F	IGHD3-10*01 F	IGHJ4*02 F	AITSVARGLRGYFDI	IGLV1-47*01 F	IGLJ2*01 F	AAWDDSLSRVV	
13	81E10	IGHV1-24*01 F	IGHD3-10*01 F	IGHJ4*02 F	AITSLARGLKGYFDS	IGLV1-47*01 F	IGLJ2*01 F	AAWDDSLSGVI	
14	81A6	IGHV3-9*01 F	IGHD2-2*01 F	IGHJ6*02 F	AKDIGCSTSCSYHYHYGMDV	IGKV2-28*01 F	IGKJ2*01 F	MQALQTPRT	
15	81B2	IGHV3-66*02 F	IGHD6-19*01 F	IGHJ4*02 F	ARDGRAVAGTD	IGKV1-33*01 F	IGKJ1*01 F	HQYDNLPRT	
16	81B7	IGHV1-18*04 F	IGHD3-10*01 F	IGHJ4*02 F	ARDYVWFGELSTEGQFDY	IGKV3-11*01 F	IGKJ3*01 F	QQRRDFT	
17	82A6	IGHV4-39*01 F	IGHD6-19*01 F	IGHJ4*02 F	ARFITDGYSSGSDS	IGKV1-39*01 F	IGKJ4*01 F	QQSYSTPRLT	
18	82C4	IGHV1-58*01 F	IGHD1-26*01 F	IGHJ6*02 F	AADRMVRVGGKYYGMDV	IGKV1-5*03 F	IGKJ2*01 F	QQYNSYSPGDT	
19	82G8	IGHV4-59*08 F	IGHD2-15*01 F	IGHJ5*02 F	ARRSMGYCSGNCYSGFDP	IGKV1-39*01 F	IGKJ4*01 F	QQSYSTPQT	
20	82B6	IGHV4-61*04 F	IGHD3-16*01 F	IGHJ5*02 F	AMTYDYDITWGRVDPQFDP	IGKV2-30*01 F	IGKJ1*01 F	CMQGHWHPPWT	
21	82B7	IGHV1-18*04 F	IGHD3-10*01 F	IGHJ4*02 F	ARDYVWFGELSTEGQFDY	IGKV3-20*01 F	IGKJ1*01 F	HQYASSTRP	
22	82C6	IGHV4-39*01 F	IGHD6-19*01 F	IGHJ4*02 F	ARFITDGYSSGSDS	IGKV2-30*02 [F]	IGKJ2*01 F	MQGHTWPMYTH	
23	82F6	IGHV3-30*03 F	IGHD2-15*01 F	IGHJ4*02 F	AKQASPYCSGSGCYSGNFDY	IGKV1-33*01 F	IGKJ4*01 F	QQGHDNPLT	
24	82A5	IGHV1-18*04 F	IGHD3-9*01 F	IGHJ4*02 F	ARVQWLRLDY	IGKV1-12*01 F	IGKJ4*01 F	QQAQGFPLT	
25	82C12	IGHV2-5*02 F	IGHD3-3*01 F	IGHJ4*02 F	AHRPAGFWSAHFDY	IGKV1-39*01 F	IGKJ1*01 F	QQSYSTPAWT	
26	51D3	IGHV3-66*01 F	IGHD1-26*01 F	IGHJ6*02 F	AREGLLVGPTGRGLGMDV	IGKV1-33*01 F	IGKJ2*01 F	QQYADLPYT	
27	51D4	IGHV2-70*15 F	IGHD3-10*01 F	IGHJ4*02 F	ARMVVRGVMLDY	IGKV1-39*01 F	IGKJ2*03 (F)	QQSYSPHPS	
28	51A3	IGHV1-18*04 F	IGHD3-10*01 F	IGHJ4*02 F	ARDLAWFGELSESPYIE	IGKV3-11*01 F	IGKJ5*01 F	QQRGNSTI	
29	51D2	IGHV2-5*01 F	IGHD3-9*01 F	IGHJ3*01 F	AHRLAPDYDFLTGYNGDDAFDV	IGKV1-39*01 F	IGKJ4*01 F	QQNSINTALS	
30	51A1	IGHV3-66*01 F	IGHD5-12*01 F	IGHJ3*02 F	ARDLNIAGGFDI	IGKV1-9*01 F	IGKJ5*01 F	HLNIDPIT	
31	51E12	IGHV3-7*01 F	IGHD2-2*01 F	IGHJ4*02 F	ARLMYYGNFDY	IGKV1-8*01 F	IGKJ2*01 F	QQYYGYPT	
32	51D12	IGHV5-10-1*03 F	IGHD2-2*01 F	IGHJ6*02 F	ARLPFCDSASCGRAYHYGMDV	IGKV3-15*01 F	IGKJ2*01 F	QQYNNWPET	
33	51F11	IGHV1-69*04 F	IGHD5-18*01 F	IGHJ4*02 F	ATGRYTYGYGYFDY	IGKV3-20*01 F	IGKJ2*02 (F)	QQYSSRT	
34	51E10	IGHV1-18*04 F	IGHD6-13*01 F	IGHJ2*01 F	ARARQLVNLWYFDL	IGKV4-1*01 F	IGKJ4*01 F	QQYITPOLT	
35	51E7	IGHV3-13*01 F	IGHD3-10*01 F	IGHJ2*01 F	ARVGYGSGSYWYLYWYFDL	IGKV1-39*01 F	IGKJ1*01 F	QQSYAPPWT	
36	51D7	IGHV5-51*01 F	IGHD6-19*01 F	IGHJ3*02 F	ATRITGWINDAFDI	IGKV1-39*01 F	IGKJ2*02 (F)	QQSYSTPCT	
37	51F5	IGHV2-70*13 F	IGHD1-7*01 F	IGHJ4*02 F	ALGRAGTMDY	IGKV1-39*01 F	IGKJ2*01 F	QQSYSPPT	
38	51E3	IGHV3-9*01 F	IGHD6-19*01 F	IGHJ6*02 F	AKDMVAGPHYGMDV	IGLV1-44*01 F	IGLJ3*02 F	AAWDDSLNGWV	
39	51B1	IGHV5-51*01 F	IGHD3-10*01 F	IGHJ6*02 F	ARHPNSFYDSGGDYAMDV	IGLV2-23*02 F	IGLJ3*02 F	CSYAGSSWV	
40	52C1	IGHV3-66*01 F	IGHD3-10*01 F	IGHJ4*02 F	ARLADSGSGSLYDFDY	IGLV1-40*01 F	IGLJ3*02 F	QSYDSSLSGSWV	
41	52G1	IGHV3-9*01 F	IGHD6-19*01 F	IGHJ4*02 F	AKDLSSGWDLFYD	IGLV3-21*04 F	IGLJ2*01 F	QYDTSGLDPLV	
42	52C6	IGHV1-69*01 F	IGHD1-26*01 F	IGHJ6*02 F	ATDGGGGSYYYAHYYYGMDV	IGLV8-61*01 F	IGLJ2*01 F	VLYMGSIGV	
43	52E7	IGHV5-51*01 F	IGHD4-17*01 F	IGHJ4*02 F	VRSDGDYVIGHDY	IGLV1-44*01 F	IGLJ3*02 F	ATWDDSLNGRV	
44	52B6	IGHV3-48*03 F	IGHD4-17*01 F	IGHJ4*02 F	ARGRDDYDYGDRGGDFDY	IGKV3-11*01 F	IGKJ3*01 F	QQRNSWPPIT	
45	52F7	IGHV3-9*01 F	IGHD2-2*01 F	IGHJ6*02 F	AKDIGVMVPGVTPYGMDV	IGKV2D-30*01 F	IGKJ2*02 (F)	MQGHTWPPGT	
46	52B8	IGHV1-69*01 F	IGHD3-10*01 F	IGHJ3*02 F	ARGPAYVSGTYWNAFDI	IGKV3-15*01 F	IGKJ2*01 F	QYDTHWPLYT	
47	52E9	IGHV3-30*04 F	IGHD6-13*01 F	IGHJ3*02 F	ARDPPNGMGSMAQHLVLLVDFDI	IGKV1-39*01 F	IGKJ4*01 F	QQYTTLALT	
48	52G9	IGHV3-66*01 F	IGHD6-25*01 F	IGHJ6*02 F	ARDPMRPGMDV	IGKV1-33*01 F	IGKJ1*01 F	QQYDNLPRT	
49	53H3	IGHV3-66*01 F	IGHD4-17*01 F	IGHJ3*02 F	ARYYQOGRAFDI	IGKV1-33*01 F	IGKJ3*01 F	QQYDNLPLT	
50	53C5	IGHV1-69*09 F	IGHD5-18*01 F	IGHJ4*02 F	ARGRYTYGTEGYFDN	IGKV1-5*01 F	IGKJ2*01 F	QQYNNLYT	
51	53G1	IGHV3-33*03 F	IGHD6-19*01 F	IGHJ4*02 F	AKGGFGYASGWYLYDY	IGKV1-33*01 F	IGKJ5*01 F	QQYGNLPIA	
52	53B2	IGHV3-13*01 F	IGHD3-22*01 F	IGHJ4*02 F	ARAYYDTSYGYNYFDH	IGKV3-15*01 F	IGKJ2*01 F	QHYNNWPLYT	
53	53H5	IGHV3-53*01 F	IGHD3-10*01 F	IGHJ5*02 F	ARGYVSGSYWGFDP	IGKV3-15*01 F	IGKJ2*01 F	QHYNNWPLYT	
54	53H6	IGHV3-53*04 F	IGHD1-26*01 F	IGHJ6*02 F	AREGLGMDV	IGKV3-15*01 F	IGKJ2*01 F	QHYNNWPLYT	
55	53F9	IGHV3-53*04 F	IGHD1-26*01 F	IGHJ4*02 F	AREGLVGTTLTFDY	IGKV2D-30*01 F	IGKJ2*02 (F)	MQGHTWPPGT	
56	53G6	IGHV2-70*15 F	IGHD1-26*01 F	IGHJ5*02 F	ARFLVGGFKAFWDFP	IGLV1-51*01 F	IGLJ3*02 F	GTWDDSLNWWV	
57	53C10	IGHV3-43*02 F	IGHD1-20*01 F	IGHJ4*02 F	ARLSPKITGYFDY	IGLV3-21*02 F	IGLJ1*01 F	QYVDDSSDPYV	
58	53E11	IGHV1-46*01 F	IGHD5-12*01 F	IGHJ4*02 F	ARDQAFIVATLGPDY	IGLV8-61*01 F	IGLJ3*02 F	VLYMGSIGV	
59	53E12	IGHV3-53*01 F	IGHD5-12*01 F	IGHJ5*02 F	AKMLWLRGWDFP	IGLV6-57*03 F	IGLJ3*02 F	QSYDTSNHV	
60	53F12	IGHV3-66*01 F	IGHD4-23*01 ORF	IGHJ6*02 F	ARDAVGSYYGMEV	IGKV3-15*01 F	IGKJ2*01 F	QHYNNWPLYT	
61	54H2	IGHV5-51*01 F	IGHD6-19*01 F	IGHJ4*02 F	ARQESGWSFDY	IGKV1-39*01 F	IGKJ1*01 F	QQSYSTPRT	
62	54F10	IGHV3-53*04 F	IGHD5-24*01 ORF	IGHJ6*02 F	ARDLEERGAMDV	IGKV3-20*01 F	IGKJ1*01 F	QQYSSLWT	
63	54G7	IGHV3-66*01 F	IGHD3-16*02 F	IGHJ5*02 F	ARAGLWRGRFDP	IGLV3-21*02 F	IGLJ3*02 F	QYVDDSTDLPHWV	
64	55G3	IGHV2-70*15 F	IGHD1-14*01 ORF	IGHJ3*02 F	ATRGLGITAFDI	IGKV1-39*01 F	IGKJ1*01 F	QQSYTTPRT	
65	55A8	IGHV1-69*04 F	IGHD4-17*01 F	IGHJ4*02 F	ARGTEYGDYDVSHD	IGKV1-5*03 F	IGKJ2*01 F	QQYNSYSHT	
66	55C9	IGHV3-53*04 F	IGHD2-15*01 F	IGHJ4*02 F	AREGLVGTALAFDY	IGKV1-39*01 F	IGKJ2*01 F	QQSYSTPPYT	
67	55G9	IGHV3-13*01 F	IGHD3-22*01 F	IGHJ2*01 F	ARVGYDSSGYWYLYDL	IGKV1-39*01 F	IGKJ3*01 F	QQSYTTPLT	
68	55G11	IGHV3-30*03 F	IGHD2-15*01 F	IGHJ4*02 F	KGGAGPYCGGSCYPTKVDY	IGKV1-33*01 F	IGKJ1*01 F	QQYDNLWT	
69	56C3	IGHV3-33*01 F	IGHD3-10*01 F	IGHJ4*02 F	AKDGGSSYNSGALDY	IGKV1-33*01 F	IGKJ2*01 F	QQYDNLPPYT	
70	56H3	IGHV3-66*01 F	IGHD4-17*01 F	IGHJ4*02 F	ARDYGDYFDY	IGKV3-20*01 F	IGKJ1*01 F	QQYSSPRT	
71	56B4	IGHV1-18*01 F	IGHD2-2*01 F	IGHJ4*02 F	ATDDPDIPLVPAAMSLDY	IGKV1-39*01 F	IGKJ4*01 F	QQNSINTALS	
72	56D7	IGHV3-66*01 F	N.D.	IGHJ6*02 F	ARDLDYGMVDY	IGKV1-9*01 F	IGKJ5*01 F	QQLNSYPPIT	
73	56H7	IGHV4-59*01 F	IGHD3-22*01 F	IGHJ6*02 F	ATDYDSSGYRYGMDV	IGKV1D-12*01 F	IGKJ4*01 F	QYDSSFLT	
74	56A8	IGHV1-69*01 F	IGHD1-26*01 F	IGHJ4*02 F	ASFGLWDLRDY	IGKV3-20*01 F	IGKJ4*01 F	QQYGTSTR	
75	56E8	IGHV3-23*01 F	IGHD2-15*01 F	IGHJ4*02 F	AKDVGSRLYDVFYD	IGKV1-39*01 F	IGKJ2*03 (F)	QQSYSTPPYS	
76	56A10	IGHV2-70*15 F	IGHD4-23*01 ORF	IGHJ4*02 F	TRTATVVKDY	IGKV1-39*01 F	IGKJ1*01 F	QQSYSTPRT	
77	56B11	IGHV2-70*15 F	IGHD6-6*01 F	IGHJ4*02 F	ARMIPALDY	IGKV1-39*01 F	IGKJ2*01 F	QQSYSTPRT	
78	56B12	IGHV2-70*15 F	IGHD6-13*01 F	IGHJ4*02 F	AREEAAGTKLDY	IGKV1-39*01 F	IGKJ1*01 F	QQSYSTPRT	
79	56C12	IGHV3-30*03 F	IGHD2-15*01 F	IGHJ5*02 F	AKDPTSLYCSGSCYNNWDFP	IGKV1-39*01 F	IGKJ1*01 F	QQYTSPTPT	
80	56E1	IGHV3-30*04 F	IGHD3-16*01 F	IGHJ3*02 F	AGGGVLVTSDDPAFDI	IGLV1-44*01 F	IGLJ3*02 F	AAWDDSLNGWV	
81	56A3	IGHV3-30*03 F	IGHD2-15*01 F	IGHJ4*02 F	AKRGGTYCSGICVGGYFDY	IGLV1-40*01 F	IGLJ3*02 F	QSYDSSLSDWGV	
82	56F3	IGHV1-46*01 F	IGHD3-10*01 F	IGHJ4*02 F	ARDYSRITMIRGAGDY	IGLV1-51*01 F	IGLJ3*02 F	GTWDDSLSAQV	
83	56H9	IGHV3-53*04 F	IGHD6-13*01 F	IGHJ5*02 F	ARGVPSSSWA	IGLV2-14*01 F	IGLJ1*01 F	SSFTSSSTPYV	
84	56H11	IGHV4-4*07 F	IGHD5-12*01 F	IGHJ4*02 F	AGEQHIVTTHDY	IGLV1-44*01 F	IGLJ3*02 F	ATWDDSLNGRV	
85	57B2	IGHV3-30*04 F	IGHD3-16*01 F	IGHJ3*02 F	AGGGVLVTSDDPAFDI	IGKV1-33*01 F	IGKJ3*01 F	QQSDNVPPVT	
86	57C4	IGHV3-15*01 F	IGHD4-17*01 F	IGHJ5*01 F	STNDDYGDYSANY	IGKV1-39*01 F	IGKJ4*01 F	QQSYSTPRT	
87	57E7	IGHV5-51*01 F	IGHD3-22*01 F	IGHJ4*02 F	ARIEYVNDSSGYQF	IGKV3-20*01 F	IGKJ1*01 F	QQYSSWT	
88	57H7	IGHV1-8*02 F	IGHD3-10*01 F	IGHJ5*02 F	ARGLWFGDLTRTKYNWDFP	IGKV1D-13*01 F	IGKJ4*01 F	QQFNFLT	
89	57A8	IGHV3-23*01 F	IGHD1-26*01 F	IGHJ4*02 F	AKGQRGSPDFDY	IGKV1-5*03 F	IGKJ4*01 F	QQNSYSPLT	
90	57B8	IGHV3-53*01 F	IGHD2-21*02 F	IGHJ4*02 F	ARDLVTWGLDY	IGKV1-9*01 F	IGKJ5*01 F	QLLNTDPT	
91	57A9	IGHV1-3*04 (F)	IGHD1-26*01 F	IGHJ4*02 F	ARAGWELNY	IGKV4-1*01 F	IGKJ1*01 F	QQYSFWA	
92	57G9	IGHV2-70*15 F	IGHD6-6*01 F	IGHJ4*02 F	ARITPHLVYDY	IGKV1-39*01 F	IGKJ2*02 (F)	QQSYSPRT	
93	57A6	IGHV5-51*01 F	IGHD6-19*01 F	IGHJ4*02 F	ARQESGWSFDY	IGLV3-19*01 F	IGLJ3*02 F	NSRSDSSGNHWV	
94	57F7	IGHV4-34*01 F	IGHD6-6*01 F	IGHJ6*02 F	ARDSSSSGVGTGMDV	IGLV1-44*01 F	IGLJ3*02 F	AAWDDSLNGWV	
95	57F8	IGHV2-5*02 F	IGHD3-10*01 F	IGHJ5*02 F	AHTTWYVYSGGWDFP	IGLV1-44*01 F	IGLJ2*01 F	AAWDDSLNGWV	
96	57A11	IGHV1-18*01 F	IGHD3-10*01 F	IGHJ5*02 F	ARVQEFWLDY	IGLV3-21*04 F	IGLJ3*02 F	QYVDDSSDHLPL	
97	57E11	IGHV1-8*02 F	IGHD3-10*01 F	IGHJ5*02 F	ARGLWFGDLTRTKYNWDFP	IGLV1-44*01 F	IGLJ3*02 F	AAWDDSLNGWV	
98	58G1	IGHV3-53*01 F	IGHD4-17*01 F	IGHJ6*02 F	ARDLEERGLDY	IGKV1D-12*01 F	IGKJ4*01 F	QNTSFT	
99	58D2	IGHV3-11*01 F	IGHD3-10*01 F	IGHJ2*01 F	ASPLSHNYSGGSYVNYWYFEL	IGKV3-11*01 F	IGKJ2*02 (F)	QLGT	
100	58A4	IGHV4-59*01 F	IGHD3-9*01 F	IGHJ5*02 F	ARTLGAAYDILTFGRTPGGWFAP	IGKV3-20*01 F	IGKJ1*01 F	QQYGSSPWT	
101	58B5	IGHV3-23*01 F	IGHD3-10*01 F	IGHJ4*02 F	AKEPSLRGILWFGELSG	IGKV3-20*01 F	IGKJ2*01 F	QQYSSLPYT	
102	58G6	IGHV1-58*01 F	IGHD2-2*01 F	IGHJ3*02 F	AAAPNCNSTTCHDGFDI	IGKV3-20*01 F	IGKJ1*01 F	QQYDNSPWT	
103	58G9	IGHV3-13*04 F	IGHD3-9*01 F	IGHJ3*02 F	ARGSLRGGILSGVAFDI	IGKV1-39*01 F	IGKJ1*01 F	QQYSSPPYT	
104	58E2	IGHV4-39*07 F	IGHD3-10*01 F	IGHJ3*02 F	ARYVPGTYDADFDI	IGLV2-14*01 F	IGLJ3*02 F	SSYSSSTWV	
105	58A3	IGHV3-30*04 F	IGHD3-10*01 F	IGHJ4*02 F	ARDWVHYGSGYPPDY	IGLV2-18*02 F	IGLJ3*02 F	SSYSSSTWV	

106	58H3	IGHV5-51*01 F	IGHD3-10*01 F	IGHJ4*02 F	ARHPVLRGNIDY	IGLV1-40*01 F	IGLJ3*02 F	QSYDSSLRGSV
107	510H2	IGHV3-66*01 F	IGHD5-12*01 F	IGHJ4*02 F	ARDKWEGTFDY	IGKV1-9*01 F	IGKJ4*01 F	QQLNSYPRMT
108	510A4	IGHV2-70*15 F	IGHD6-13*01 F	IGHJ4*02 F	ARVQVAAAAGSPYDY	IGKV2-28*01 F	IGKJ1*01 F	MQALQMG
109	510G4	IGHV4-31*03 F	IGHD4-23*01 ORF	IGHJ4*02 F	ARDYGGNSNYFHY	IGKV1-33*01 F	IGKJ4*01 F	QQYDTPLT
110	510H4	IGHV3-66*01 F	IGHD5-18*01 F	IGHJ6*02 F	AETGWDGMDV	IGKV3-11*01 F	IGKJ1*01 F	QQRSNWPPT
111	510A5	IGHV3-9*01 F	IGHD3-9*01 F	IGHJ4*02 F	AKDRGYEILTPASFDY	IGKV1-39*01 F	IGKJ2*01 F	QQSYSTPPYT
112	510F6	IGHV2-5*02 F	IGHD5-18*01 F	IGHJ4*02 F	AHSLPSKYSYSYGSFDDY	IGKV1-39*01 F	IGKJ2*01 F	QQSYSAPTY
113	510D7	IGHV1-69*04 F	IGHD5-18*01 F	IGHJ4*02 F	ATGRYTYGYGYFDY	IGKV3-20*01 F	IGKJ2*02 (F)	QQYSSPRT
114	510E10	IGHV3-23*01 F	IGHD3-10*01 F	IGHJ5*02 F	AKGELLWFGELENWFDP	IGKV1-12*01 F	IGKJ1*01 F	QQADSFPT
115	510H10	IGHV2-70*15 F	IGHD6-13*01 F	IGHJ4*02 F	ARIQRGIAADY	IGKV1-39*01 F	IGKJ2*02 (F)	QQSYSTPRT
116	510B1	IGHV5-51*01 F	IGHD3-10*01 F	IGHJ3*02 F	ARLPHFGSGSYGNAFDI	IGLV1-47*01 F	IGLJ3*02 F	ATWDDSLTGPV
117	510G2	IGHV7-4-1*02 F	IGHD3-10*01 F	IGHJ6*02 F	ASTVGRSGTYGYGNYYSMDV	IGLV2-14*01 F	IGLJ2*01 F	AAWYDSSSTSVV
118	510H7	IGHV4-59*08 F	IGHD6-13*01 F	IGHJ5*02 F	ARHCWPQQVLSNWFDP	IGKV1D-13*01 F	IGKJ4*01 F	QQFNNFLT
119	510H6	IGHV1-46*01 F	IGHD3-3*01 F	IGHJ6*02 F	ARTGFLIPSKGGGMDV	IGLV2-14*01 F	IGLJ2*01 F	SSYTSSSLQI
120	510C4	IGHV3-48*03 F	IGHD1-26*01 F	IGHJ4*02 F	ARDPGEWESLDLDY	IGLV1-40*01 F	IGLJ3*02 F	QSYDSSLSGNWW
121	511A1	IGHV4-31*03 F	IGHD6-13*01 F	IGHJ6*02 F	AREKIRSIAAAAGTVYYYGMDV	IGKV3-15*01 F	IGKJ1*01 F	QQYNNWPPWT
122	511B4	IGHV4-59*08 F	IGHD3-22*01 F	IGHJ5*01 F	ASTYWDSSGGYGYVDDY	IGKV1D-12*01 F	IGKJ4*01 F	QQYDSSALV
123	511E7	IGHV5-51*01 F	IGHD3-10*01 F	IGHJ4*02 F	ALAVGRGIPTSYFDY	IGKV1-33*01 F	IGKJ3*01 F	QQYHNLPT
124	511G7	IGHV3-33*01 F	IGHD4-17*01 F	IGHJ4*02 F	AKNGYSYGDYLRGFDY	IGKV1-33*01 F	IGKJ1*01 F	QQYHNPVA
125	511E9	IGHV1-18*01 F	IGHD3-10*01 F	IGHJ4*02 F	AREGAGLIAYDY	IGKV6-21*01 F	IGKJ2*01 F	HQSSSLPYT
126	511D1	IGHV1-18*01 F	IGHD2-15*01 F	IGHJ6*02 F	AVLDYCSGSSSSGYNYGMDV	IGKV3-20*01 F	IGKJ2*01 F	QQYGRSPYT
127	511H11	IGHV3-13*04 F	IGHD6-19*01 F	IGHJ6*03 F	VRGDHSSGWTYYYMDV	IGKV1-39*01 F	IGKJ1*01 F	QQSYSSPPWT
128	511D12	IGHV3-66*01 F	IGHD5-12*01 F	IGHJ3*02 F	ARDLDIAGAFDI	IGKV1-9*01 F	IGKJ5*01 F	QLLNSFPIT
129	511A5	IGHV4-31*06 F	IGHD3-22*01 F	IGHJ2*01 F	ARIYRGTMVVVFSDLHWYFDL	IGLV3-21*04 F	IGLJ1*01 F	QVWSSADHYV
130	511E5	IGHV1-2*02 F	IGHD3-16*01 F	IGHJ2*01 F	ARDSLFSRVDWYFDY	IGLV1-40*01 F	IGLJ2*01 F	NSRDSNGTVP
131	511G5	IGHV1-46*01 F	IGHD6-6*01 F	IGHJ4*02 F	ARDGALYSNSPTEFDY	IGLV1-47*01 F	IGKJ4*01 F	TTWADSRGGWV
132	511B7	IGHV1-46*01 F	IGHD2-2*01 F	IGHJ4*02 F	ARGGLVPAVMPALDY	IGLV1-47*01 F	IGLJ3*02 F	AAWDDSLSGPV
133	511H7	IGHV3-23*01 F	IGHD3-22*01 F	IGHJ6*02 F	ARGLPYYDYTSYGYKDSYYYGVDDV	IGLV1-47*01 F	IGLJ3*02 F	AAWDDSLSGPV
134	511B11	IGHV3-7*03 F	IGHD3-10*01 F	IGHJ4*02 F	AGLFWYGGYFDY	IGLV1-40*01 F	IGLJ1*01 F	QSYDRSLSVLYV
135	59B11	IGHV3-13*04 F	IGHD3-3*01 F	IGHJ6*03 F	ARGTQDRVELMVGSPYYYMDV	IGKV1-39*01 F	IGKJ2*01 F	QQSYITIMYT
136	59D6	IGHV3-34*01 F	IGHD3-22*01 F	IGHJ4*02 F	ARHRRDYITMIVRPTLWAFDY	IGLV1-40*01 F	IGLJ2*01 F	QSYDSALV
137	59A1	IGHV3-66*01 F	IGHD1-26*01 F	IGHJ4*02 F	ARELGPVGGTDQ	IGKV1-39*01 F	IGKJ2*01 F	QQSHSTPYT
138	59A2	IGHV3-66*01 F	IGHD2-15*01 F	IGHJ4*02 F	ARDLPLHGDYFDY	IGKV1-33*01 F	IGKJ1*01 F	QQSDNFWPT
139	59H6	IGHV3-30*04 F	IGHD2-15*01 F	IGHJ4*02 F	ARETLGGYCNGSSCYDAGYFDY	IGKV3-20*01 F	IGKJ1*01 F	QQYSSPWT
140	59G12	IGHV3-33*01 F	IGHD3-3*01 F	IGHJ4*02 F	ARDGVDFGMVTFEDY	IGKV1-39*01 F	IGKJ1*01 F	QQSYNPPWT
141	8B1E6	IGHV4-4*02 F	IGHD3-16*01 F	IGHJ4*02 F	ARVOGLIDY	IGKV1-NL1*01 F	IGKJ2*02 (F)	QQYSTPPRT
142	8B1B1	IGHV5-51*01 F	IGHD6-13*01 F	IGHJ6*03 F	ASQAAAAGYVYMDV	IGKV1-39*01 F	IGKJ1*01 F	QQSYNLTWT
143	8B1H12	IGHV3-23*01 F	IGHD4-17*01 F	IGHJ5*02 F	AKQTDYGVGWFDY	IGKV1-33*01 F	IGKJ4*01 F	QQYDNFSLT
144	8B1E11	IGHV1-69*06 F	IGHD3-10*01 F	IGHJ4*02 F	AVLPLHSSYNWYFDY	IGKV3-11*01 F	IGKJ2*01 F	QQRSNWPPGMYT
145	8B2F2	IGHV2-5*02 F	IGHD6-13*01 F	IGHJ5*02 F	AHQRHSSNSWYVSAWFDY	IGLV1-40*01 F	IGLJ1*01 F	QSYDSSLGNFV
146	8B5A6	IGHV3-33*01 F	IGHD6-13*01 F	IGHJ4*02 F	AKGGWYSSKYYFDY	IGKV2-28*01 F	IGKJ1*01 F	MQALQMG
147	8B2D5	IGHV3-13*01 F	IGHD4-17*01 F	IGHJ3*02 F	ARGSDTVTTAFDI	IGKV1-39*01 F	IGKJ4*01 F	QQSYTTPGLT
148	8B2H8	IGHV3-53*04 F	IGHD3-10*01 F	IGHJ4*02 F	AREAPNSRSGSTNFYD	IGKV1-39*01 F	IGKJ2*01 F	QQSYSTPPYT
149	8B2D11	IGHV3-33*01 F	IGHD5-18*01 F	IGHJ4*02 F	AKNGYSYAYPRQYFDY	IGKV1-33*01 F	IGKJ2*02 (F)	QHYDNLKVT
150	8B2E4	IGHV4-31*03 F	IGHD3-10*01 F	IGHJ4*02 F	ARVSRVYTMVRGIFDY	IGLV2-23*02 F	IGLJ2*01 F	CLYAGHSTYVV
151	8B2G6	IGHV4-38-2*02 F	IGHD2-21*02 F	IGHJ4*02 F	ARVGVATILGVDDY	IGLV6-57*03 F	IGLJ3*02 F	QSYDSSWV
152	8B2E12	IGHV3-30*03 F	IGHD6-19*01 F	IGHJ6*02 F	AKGGGYISAWSTRYAMDV	IGLV2-14*01 F	IGLJ3*02 F	SSYTSSTWV
153	8B3E9	IGHV3-23*01 F	IGHD6-13*01 F	IGHJ4*02 F	AESSSLTGNFNY	IGLV3-21*03 F	IGLJ3*02 F	QVWDTAWV
154	8B5A1	IGHV3-13*01 F	IGHD5-18*01 F	IGHJ4*02 F	ARGDFTTTGFYFDY	IGKV1-NL1*01 F	IGKJ1*01 F	QQDYNFPPWT
155	8B5B6	IGHV1-69*04 F	IGHD3-10*01 F	IGHJ6*03 F	ARTEYSYDSGSSRAYSMV	IGKV1-39*01 F	IGKJ1*01 F	QQTHSTPRT
156	8B5E5	IGHV7-4-1*02 F	IGHD6-13*01 F	IGHJ5*02 F	ARVGPSSSWPS	IGKV1-39*01 F	IGKJ1*01 F	QQSYSTPRT
157	8B5C1	IGHV3-33*01 F	IGHD6-13*01 F	IGHJ4*02 F	AKGGWYSSKYYFDY	IGKV2-28*01 F	IGKJ1*01 F	MQALQMG
158	8B5F7	IGHV3-7*01 F	IGHD3-3*01 F	IGHJ4*02 F	ARDLGLVWFGDPY	IGKV1-NL1*01 F	IGKJ1*01 F	QQYSSAPRT
159	8B4G4	IGHV2-5*02 F	IGHD3-9*01 F	IGHJ4*02 F	AHSPDRHYFDVLTGYFNSERFYFDY	IGLV1-51*01 F	IGLJ2*01 F	GTWDDSSLAGV
160	8B4A7	IGHV4-39*07 F	IGHD6-6*01 F	IGHJ6*02 F	ARIPRHLQGDHYYYVMDV	IGLV2-23*01 F	IGLJ1*01 F	CSYAGIFV
161	8B4D9	IGHV3-30*03 F	IGHD5-18*01 F	IGHJ4*02 F	AKAAGGGYSYIYWGDDY	IGLV6-57*03 F	IGLJ3*02 F	QSYDSSNLWV
162	8B4E1	IGHV4-61*01 F	IGHD2-2*01 F	IGHJ6*02 F	AREYFVSLPAAQTLTYGGYD	IGKV3-15*01 F	IGKJ1*01 F	QQYKNNWPPWT
163	8B4H2	IGHV1-8*02 F	IGHD3-10*01 F	IGHJ5*02 F	ARGLWFGDLTRTKYNWFDP	IGKV3-20*01 F	IGKJ4*01 F	HQYDSSPLT
164	8B4A3	IGHV1-46*01 F	IGHD3-10*01 F	IGHJ6*02 F	ARDPSPSNGYDNIWETRSENHYNYGMDA	IGKV3-11*01 F	IGKJ4*01 F	QQRSNWPLYT
165	8B4C5	IGHV3-11*06 F	IGHD6-19*01 F	IGHJ4*02 F	ARDGSAVAGPMSYFDY	IGKV1-NL1*01 F	IGKJ1*01 F	QQYSSIPRT
166	8B4E5	IGHV2-70*15 F	IGHD6-19*01 F	IGHJ4*02 F	AREVAGAVHLDY	IGKV1-39*01 F	IGKJ1*01 F	QQSFSTPRT
167	8B4B6	IGHV3-7*03 F	N.D.	IGHJ4*02 F	ARDLGLVWFGDLLF	IGKV1-NL1*01 F	IGKJ1*01 F	QQYYSDDPRT
168	8B4E11	IGHV4-59*01 F	IGHD3-10*01 F	IGHJ4*02 F	ARGGYYFGPPRFDDY	IGKV3-20*01 F	IGKJ2*01 F	QHYGSSPOYT
169	13G9	IGHV1-58*01 F	IGHD2-2*01 F	IGHJ3*02 F	AAPYCSSTSCRDFDI	IGKV3-20*01 F	IGKJ1*01 F	QQYGRSPWT

Supplementary Table 6. BCR RT-PCR Reaction mixture and PCR Program setup

Section 01. Single Cell BCR RT-PCR Procedure**1. Preparation of PCR Reaction Mixture****(1) Preparation of RT****a. Preparation of RT_Mix_A (5µl/tube)**

Seq.	Component	Amount (µl)
1	Water	2.6
2	2.5 mM dNTPs	2
3	BCR RT Primer Mix	0.4

b. Preparation of RT_Mix_B (5µl/tube)

Seq.	Component	Amount (µl)
4	Water	2.25
5	5×PrimeScript II Buffer	2
6	200 U/µl PrimeScript II Reverse Transcriptase	0.5
7	40,000 U/ml RNase Inhibitor, Murine (NEB)	0.25

(2) Preparation of 1st and 2nd PCR (10µl/tube)

1st PCR Mix N and 2nd PCR Mix N use the same reaction condition except the primers.

Seq.	Component	Amount (µl)
1	2×PrimeSTAR GC Buffer (Takara)	5
2	nuclease-free water	2.75
3	2.5 mM dNTP	0.8
4	10 µM Forward Primer	0.2
5	10 µM Reverse Primer	0.2
6	2.5 U/µl PrimeSTAR HS DNA polymerase	0.05
7	Template	0

(3) Usage of primers**a. For 1st_PCR_Mix**

	For 1st PCR Mix Gamma	For 1st PCR Mix Kappa	For 1st PCR Mix Lambda
Forward Primer	AP G leader Mix	AP K leader Mix	AP L leader Mix
Reverse Primer	G289 primer(10µM)	K244 Primer(10µM)	L81 Primer(10µM)

b. For 2nd_PCR_Mix

	For 2nd PCR Mix Gamma	For 2nd PCR Mix Kappa	For 2nd PCR Mix Lambda
Forward Primer	10 µM AP Primer	10 µM AP Primer	10 µM AP Primer
Reverse Primer	IGHJ region Primer Mix	10 µM K194 Primer Mix	10 µM L19 Primer Mix

2. Operation Procedure

- Take out the sorted 96-well plate at -80. Add 5µl RT_Mix_A to each well, and rinse the well to promote cell RNA dissolution.
- Incubate the plate at 65° for 5min and put it on ice immediately.
- Add 5µl of RT_Mix_B to each well of the plate, mix and centrifuge, and then perform RT reaction.
- 9µl aliquots of 1st_PCR_Mix in a new 96 wells plate, add 1µl RT product to each well, and then perform 1st PCR Reaction.
- After PCR is completed, the 1st product is ten-fold diluted, and 1µl is used as a template for the next round of PCR.
- 9µl aliquot 2nd_PCR_Mix in a new 96 wells plate, add 1µl 1st diluted product to each well, and then perform 2nd PCR Reaction.
- Prepare 2% agar gel, load 3µl sample to analysis PCR result.

Section 02. PCR Program Setup**1. For RT Reaction**

45°	45min
70°	15min
4°	infinity

2. For 1st PCR Reaction

95	3min	30cycles
95	10s	
55	5s	
72°	1min	
72°	5min	
4°	infinity	

3. For 2nd PCR Reaction

95	3min	35cycles
95	10s	
55	5s	
72°	45s	
72°	5min	
4°	infinity	

Supplementary Table 7. Preparation of BCR Cloning primers

Step 01. Dissolve primer powder in water
the leader primers and J-region primers are dissolved to 100uM the other primers are dissolved to 10uM
Step 02. Preparation of BCR RT Primer Mix (each 2uM)
take 100ul G289_primer(10uM), K244_primer(10uM), L81 primer(10uM), respectively, then mix according to 1:1:1.
Step 03. Preparation of AP Leader Mix (each 2uM)
(1) For AP_G_Leader_Mix: Add 380ul water to a 1.5ml centrifuge tube, and take 20ul each of the 31 GV_N primers, and the final volume is 1000ul; (2) For AP_K_Leader_Mix: Add 620ul water to a 1.5ml centrifuge tube, and take 20ul each of the 19 KV_N primers, and the final volume is 1000ul; (3) For AP_L_Leader_Mix: Add 580ul water to a 1.5ml centrifuge tube, and take 20ul each of the 21 LV_N primers, and the final volume is 1000ul;
Step 04. Preparation of IGHJ region Primer Mix (each 2uM)
Add 920ul water to a 1.5ml centrifuge tube, and take 20ul each of the 4 IGHJ_N primers, and the final volume is 1000ul;
Step 05. Preparation of K194 Primer Mix
take 100ul each of the following 2 primers, then mix: K194-primer-01 (10uM) K194-primer-02 (10uM)
Step 06. Preparation of L19 Primer Mix
take 100ul each of the following 3 primers, then mix: L19-primer-01 (10uM) L19-primer-02 (10uM) L19-primer-03 (10uM)